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Installing . . .

QUALITY CONTROLLED PAPERWORK & RECORD KEEPING

Technical Information Service of the National Records Management Council

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Quality Controlled Paperwork and Record Keeping

Technical Information Service Bulletin

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Foreword

Emmett J. Leahy
National Records Management Council

Quality control is the newest of scientific controls applied to the rising tide of paperwork and record keeping. Born and bred in the factory, quality control has been introduced into the office on the strength of a winning performance:

Company A (merchandising) – Improved quality in one department by over 45 per cent and increased the production index by 25 points (from about 82 to 107).

Company B (life insurance) – Decreased percentage of errors by at least 50 per cent in addition to initial net savings of $1,500 to $2,500 in pilot divisions.

Company C (production) – Improved quality by over 50 per cent and effected first-year savings of over $100,000.

City Government – Increased quality of record keeping by 73 per cent with initial savings of over $200,000.

In a period of three decades, quality control in factory operations has become a vastly successful program, expanding rapidly but securely on the basis of proved installations producing better products at lower costs. The application of quality control to industrial operations is testified by the acceptance in hundreds of companies engaged in such widely varying fields as air conditioning and ammunition, to telephones and tractors. The application of quality control to paperwork is a promise of vastly extended benefits and dollar savings based on successful pilot installations.

This pamphlet is based on the collective experience of tried and proved applications of quality control to paperwork and record keeping. The National Records Management Council aims to inform the reader, aware of the major role of paperwork in the total management picture, of what quality control is, what it has done and what, with proper administration, it can do for you in clerical operations.

This first combined account of success in applying quality control to paperwork and record keeping is not intended to delimit quality control simply to the kind of clerical operations or the types of companies described. On the contrary, there is excellent reason to expect and possibly to guarantee a greater potential in further applications of quality control to paperwork and clerical operations.

For example, quality control can and has resulted in birth control on paperwork. Is a given letter, report or form needed at all? If so, is one or more of the copies needed? Again, if so, need the original or any of the copies be filed at all? And finally, which copies should be filed, how and for how long?

The answer to these questions for the first time are satisfying the complementary instincts of the executive, the methods man, the records manager and the archivist.

Mr. Arthur Barcan, who developed and edited this publication, received the National Records Management Council Fellowship in 1951 for advanced study in paperwork and record keeping controls. As Vice President, Mr. Barcan is currently directing the Council's Records Management installations for the Cities of Detroit and San Francisco.

Introduction

H. F. Dodge
Bell Telephone Laboratories

Inspection for Quality Assurance

At the half-century mark, we are witnessing an increased emphasis on quality and on ways and means of producing better quality, more dependable quality, and at less cost.

By quality assurance will be meant the assurance that quality will meet the goal that has been set for it. In general, this goal is an over-all quality that is "satisfactory, adequate, dependable and economic." The principles of quality control to be touched upon apply equally to products of human activity as well as of repetitive manufacture – as, for example, the output of manual and clerical operations in merchandising and office work, which are being statistically controlled with greatly reduced errors.

If experience is any guide, production processes do not become controlled of their own volition but rather through unrelenting human effort – experimenting, encountering failures and disturbances, finding out why things went wrong, correcting the causes, experiencing new troubles, and repeating the procedure over and over again. This is one of the basic tenets of quality control methods – finding out why things don't behave as they should, rooting out causes, and taking steps to prevent their recurrence. Experience indicates two things: first, that steps taken to control quality at a satisfactory level tend to reduce costs and, second, that once control is attained, it tends to continue.

Here is the forward-looking attitude that we need to cultivate more intensely. Here is the way to make tomorrow's product better than today's.

Chapter 1

What Is Quality Control

Arthur Barcan

National Records Management Council

Quality control is an effective system developed to measure, improve and maintain the quality of a repetitive operation. In factory operations or clerical operations, it is geared to lower costs through higher quality by using established standards and scientific controls. In the area of paperwork and record keeping, quality control aims to achieve and maintain better records, less paper, fewer errors and reduced costs.

Quality control determines the standards and variations from standards in an operation, measures these variations and, finally, controls them. In all repetitive operations, each unit of product varies in some degree from every other unit. The quality of all repetitive paperwork operations will vary in the number of errors made, the relative number of records processed and filed, the unit costs of record making and record keeping and the amount of records destroyed or in storage.

Identifying the types of variations in a process accomplishes four major objectives:

1. Pinpoints the actual or potential reasons for substandard quality.
2. Highlights how quality may be improved without adding to production costs.
3. Indicates what may be reduced in processing or inspection to cut costs while bettering quality.
4. Determines the capabilities of new processes and operations (providing a sound basis for established standards or goals).

In some cases, the standards for quality must be developed out of actual measurements of the product being studied, such as the number of allowable errors in typed orders. In others, standards equally applicable to business and government have already been developed, such as the number of cubic feet of records to be maintained in an efficient office. The key to a decision on standards of quality is technically called the "economic tolerance level" or what the layman might define as the point of maximum return; that is, striking a balance between the value of each quality level and the cost of maintaining it.

Having identified and measured the variations, quality control gets results by evaluating the operations on a continuing basis in light of local or existing standards. Comparing the actual with the standard is a quick indicator to management as to whether the operation is at the desired quality level and what the performance will probably be like in the future. Recognizing the measured variations as normal is a good sign to management that the clerical operation is under control and within the standards set by management. A variation that is not normal in the light of existing standards is a signal for action or, at least, a warning that the operation is not under control and requires additional attention.

In daily experience it's the same kind of seasoned judgment on which one depends to know how much

time to allow for shaving or for making the trip to the office. In baseball it's common for a manager to rely on the "law of averages" in selecting a pinch hitter who has performed consistently well in a particular ball park or against particular pitchers. Similarly, quality control provides management with scientific techniques for knowing, within established limits, whether the job is getting done as well as it should be.

Proved Benefits of Quality Control

Quality Control:

Creates an improved record.

Reduces costs.

Increases productivity.

Improves public relations.

The impressive quality control feature of better quality with reduced inspection lies in the scientific technique of selecting only that portion of the clerical product which needs verification – when it is needed – and in the minimum quantities needed. This has resulted not only in reducing the number of full-time inspectors, but also, in some cases, in maintaining effective controls on a part-time basis.

Experience has firmly established that 100 per cent inspection does not result in 100 per cent quality. On the contrary, research indicates that 100 per cent inspection frequently fails because of inspection fatigue, boredom and distraction. A mail order house found 21 per cent errors in the typed customers' orders in spite of 100 per cent inspection. Even the best is rarely better than 95 per cent perfect.

Companies using quality control quote over 10 per cent reduction in error in the initial weeks after installation. Over a two-year period, Aldens' pioneering efforts brought it a 25.4 per cent reduction in customer adjustments. The installation at Prudential Insurance Company resulted in decreasing errors by 50 to 90 per cent. Council control installations point to an average 65 per cent reduction in record keeping which results in measured annual benefits from saving in space and equipment of $75,000 to $300,000. It has, therefore, become sound business practice for numerous advertising campaigns, including those of electrical, milk and tractor comapnies, to announce with pride, "Quality Controlled from the plant to you."

Quality Control – Tried and Tested

In factory operations: The modern concept of quality control by scientific methods was introduced for the first time in the early 1920's. The Quality Control Chart was invented in the manufacturing plants of the Bell Telephone System. The Bell Telephone Laboratories and Western Electric jointly developed a pioneer set of sampling inspection tables for shop use. Quality control has since been adopted by many other industrial concerns as a means of attaining the numerous benefits outlined above. Upon request of the War Department, an American Standards Association Committee developed three American War Standards on Quality Control which were released in 1941 and 1942. During World War II, the United States Government, through the Office of Production Research and Development, highlighted the importance of quality control by undertaking a formal program to extend its use in industry. Products of the campaign included accelerated training courses at universities throughout the country and twelve reports of successful installations in different industries.

In clerical operations: It was Aldens' Chicago Mail Order Company which first saw the advantages to be gained by applying the same techniques to clerical operations in 1945. At present, quality

control is being used for office operations in such widely diverse companies as American Telephone and Telegraph and Prudential Insurance Company. It has been adapted to verify punched card operations in both the Bureau of Census and the Bureau of Old Age and Survivors Insurance. Controls on record keeping have also been installed by organizations such as the Borden Company, General Electric, and Pan American, with NRMC assistance.

The Council survey noted one healthy feature throughout the growth pattern of quality control. Within each industry and within each company, acceptance of the program has been based on pilot tests and proved installations. Rapid program growth has been due almost entirely to the appeal of the "better mouse trap" – the one that really worked.

Profitable Paperwork Areas for Quality Control

Any office featuring a repetitive operation is a potentially profitable area. There are basically five types of paperwork within this definition. The first four deal with quality control of record making (creating and processing paperwork); the fifth, with quality control of record keeping.

Continuous Clerical Production – a routine, recurring operation by the same labor source. Examples of continuous production are typing, filing and mail handling in one office; processing invoices, orders or vouchers; processing punched cards for tabulating machine systems; posting to inventory, personnel or production records; etc.

Lot-by-Lot Clerical Production – a type of paperwork usually coming from different sources of clerical labor. Examples of lot-by-lot production are: review of invoices or bills submitted by outside companies; review of records, returns, etc., maintained by different offices in the same or different organizations.

Continuous Control Reporting – a periodic report to management evaluating status, progress or productivity. The "quality-controlled" report aims to point up what has happened, whether the results are good or bad and whether follow-up action is required. It is the antidote to the statistics frequently massed for management without signposts, directional signals or early warning devices. Examples of continuous control reporting are the evaluated records on unit costs, utilization of equipment, sales –– forecast and actual, and vital statistics.

Intermittent Records Operations – a type of paperwork which only arises at periodic or odd intervals during the year. Examples of intermittent records operations are periodic reconciliation of actual and book value of inventory; periodic audit of accounts.

Continuous Records Maintenance – the continuous handling and accumulation of quantities of records in different units of the organization. Examples of record maintenance are routine growth of active files (correspondence, bills, reports, etc.) in regular office space and equipment; haphazard storage of inactive records; scientific storage in new-type records centers.

Within these groups, quality control has been used to measure performance against existing standards as well as to help develop realistic standards. It has been used to improve established operations or to test the capabilities of new ones – with equal success.

The following signs usually indicate need for effective quality control:

1. High percentage of defects with a high percentage of rework.
2. High rate of customer complaints and adjustments.
3. High maintenance costs (space, equipment and personnel) of record keeping.

4. High inspection costs: large number of inspectors, and duplicating or high percentage of inspections.

5. High number of unevaluated management reports, massed and meaningless.

6. Uncertainty on what the present quality is or what may reasonably be expected.

Control Techniques in Records Quality

Quality control of paperwork depends, even more than do industrial operations, upon a control plan which can be learned quickly and maintained readily. A winning feature of the program has been its ability to maintain effective controls on a part-time basis.

There are four control techniques which are particularly applicable to paperwork and record keeping. These are discussed in greater detail in Chapter VI:

1. The Control Chart to highlight and help evaluate actual performance, trends and target quality levels.

2 & 3. The single sampling plan and continuous sampling plan for inspection and control of recurring paperwork operations (those previously described as continuous and lot-by-lot production).

4. The sampling survey for inspection and control of record keeping and intermittent paperwork operations.

It is worth noting that statistical techniques are but one phase of the quality control program. In an operation showing a high rate of error, for example, it is initially important to concentrate on reducing the rate of error by analyzing the procedure and pinpointing the number, kind and sources of error. The exact timing for sampling techniques will depend upon the type of records operation, the cost of existing inspection methods and the amount of training required.

Installing Quality Control of Paperwork

Before outlining the steps of installation, it is pertinent to note the five foundation stones of an effective quality control program. No one can hope to control quality adequately without complying with all five:

1. Study all phases of the existing clerical operation. Identify actual or potential sources of error along with established or tentative standards of quality.

2. Develop a readily understood and easily administered control plan.

3. Install quality control in a pilot production unit.

4. Evaluate and act on results obtained from the pilot unit.

5. Extend the program to other potentially profitable applications in paperwork and record keeping.

Note that, despite the concentration of quality control literature on statistical techniques, sampling is but a potential part of the control, a basic tested system for improving quality and maintaining the improved quality. The techniques of any specific control plan, such as availability of standards, use of sampling, selection of control devices, will vary with the needs and character of the individual operation.

Quality control was initiated by engineers and statisticians concerned with industrial practices. Every text on the subject takes its examples of problems and solutions from the factory. It is no coincidence that the publication of the American Society for Quality Control is titled, "Industrial Quality Control." Where successful installations of paperwork control have been described on paper, the discussion has been largely limited to the problems encountered and solutions developed within these installations. The purpose of this study is, therefore, to utilize what has been developed and to generalize on personal and collective experiences in order to assist in accelerating the application of quality control to record making and record keeping.

The accompanying articles are detailed explanations of successful applications which represent a cross section of varying professions, geographical areas and types of administrative controls.

The significant point in the case histories of Aldens, Prudential or Council installations is the consistent growth pattern of quality control – tested, proved, accepted and extended. With quality control, "better and fewer records at lower costs" need not be a hope – it can be an accomplishment.

Chapter 2

Quality Control in Aldens, Inc.

William M. Wilkerson

Aldens, Inc.

The Practical Approach

The operating man at Aldens does not know too much about statistical terminology. It is not his job to know the difference between "Measurement of Variations" and "Three Sigma Limit." But instead, he must concentrate on keeping customer complaints at a minimum. An important aspect of his job is the correction of errors, the errors made in handling orders and order papers. At the same time he should reduce these errors with the lowest possible cost.

It is with this practical approach that we at Aldens have gone into Quality Control from the very beginning of our program.

The Author:

Mr. Wilkerson received his B.A. from the University of Chicago and conducted his post-graduate studies at Northwestern University. As Service Auditing Manager, he presently supervises the operation of Aldens' Quality Control Program. In this capacity Mr. Wilkerson has seen the program applied to merchandising and paperwork.

Successful Pilot Installation

Aldens Statistical Quality Control, as we know it today, improves upon inspection procedures in effect for many years. Even before World War II, Aldens had a strong inspection program based on sampling of orders in process similar to the practice in other industries. Statistical Quality Control strengthened this program by adding the features of standardized statistical methods and controls.

The first installation was in the merchandise operating division. Statistical Quality Control provided the pilot departments with the following standardized methods immediately after installation:

1. A given daily (hourly, in some instances) number of orders inspected in a uniform manner.
2. A standardized method of expressing the inspection and its error percentage.
3. A standardized method of showing the results and the meaning of the results in terms of control limits.

Within the first three months of the spring, 1945 season, the merchandise departments using Quality Control dropped from 2.5 per cent errors to 1.1 per cent.

Control of Paperwork

With such initial success, we extended Quality Control to other activities. The first clerical operation under Quality Control was the Billing Department, which had the extra error hazard of billing on schedule. Within four months after installation, the error ratio in billing dropped from 2.3 per cent to 1.3 per cent.

The above describes what we have accomplished. This is how we do it:

1. The Inspection Department provides the unit to be controlled with a printed chart, fifteen inches high and ten feet long. This chart is lined off in thirteen horizontal lines, to denote possible error ratios, and twenty-six vertical squares to denote working days in the month. Thus, after entering the date at the bottom of the square, we have a space four and one-half inches wide and more than a foot high to make the plottings for any one day.

2. The Inspection Department provides the operating unit with supplies for plotting the chart. This insures uniform control charts, more easily understood, throughout the company.

3. The control chart is made up for immediate use; that is the goal line, the upper control limit, and the previous month's average are all entered on the chart by the Inspection Department. This arrangement gives the Inspection Staff some control over the use of the chart without taking it out of the hands of the operating unit.

Using Control Techniques

Once the chart is prepared and the department inspector fully instructed on Quality Control procedures, the operating unit is ready to go ahead on its own. This brings up an important aspect of Aldens' Quality Control which we have applied to all our operations, Merchandise and Clerical. The operating unit itself is responsible for what goes on the chart. It is an inherent part of Quality Control that the operating units need be sold on the Program and on the relationship between their work and the results shown on the chart. This sense of "belonging" is lost if an outside organization, such as the Inspection Department, maintains the chart.

By the same token, if the unit inspector does not give a true picture, or if the department manager is not concerned with the results, the value of Quality Control is likewise reduced. Time and again we have noted positive results where department managers have taken active interest in the control operations and poor results in the few instances where the Quality Control charts were ignored or followed up with indifference.

Added Improvement

There was a period after the first big improvement in Billing when the error ratio showed no further improvement and, instead, seemed to deteriorate. We decided to modify our technique by breaking down the Billing quality control chart into six different charts, each chart representing a different group of billers. This enabled Billing Management to study each operating group individually and, at the same time, stimulate healthy competition among the units.

Although multiple charts can be overdone to the point of being uneconomical, there are many advantages when used properly. For one thing we automatically obtain a greater sample and a better sample. Secondly, we identify isolated units that may have been causing trouble but which would have been omitted or slighted in the larger picture.

From the very beginning, indoctrination plus the control charts instilled "Quality consciousness" throughout the Department – which translated this concern for accuracy into fewer errors.

The gratifying part of this installation was that, shortly thereafter, there was a drop in customer complaints – even greater than the actual drop in errors.

Quality control has since been applied to other clerical operations: such as the opening of mail, the reading, routing, and indexing of orders, approval and posting of credit orders, and key-punch and tabulating of gross sales. Key-punching in the sales listing unit involves the punching of only three items: media (catalog), state (of purchaser), and amount of sale. Inspection is by visual comparison only – "orders vs. punches." The Quality Control inspector matches a sampling of orders before they have been released by the operator with the corresponding punched cards.

Our records for June, 1947 show an error ratio of 1.4 per cent. By September of the same year the errors had dropped to .8 per cent. The latest record shows .2 per cent although it has dropped to .1 per cent or less at other times. In Credit, errors were reduced in half after installing quality controls.

With the installation of a key-punch activity on Returned Goods Listing, we found additional benefits afforded by the control chart. Beginning with fairly green operators on a vastly more complicated punched card operation, the tendency was to blame the operators for a high ratio of errors. We quickly learned that the machines could also be wrong at times. Detailed error analysis, a basic part of our quality control activity, highlighted the source of errors. Thus, we found in correcting an error that the employee was operating accurately but the machine was making the same wrong punches.

Checking the Inspector

Aldens maintains a separate and independent inspection by the Service Auditing Section to double check quality control results maintained by the operating departments.

Where the independent result varies markedly from the department's figures, there is usually something wrong. To date, the double check has disclosed and corrected such mistakes as poor selection of samples, improper inspection of the product, etc.

There is a mathematical formula which can be used for double checking results. It takes into consideration the relative size of the comparative samples and the relative ratios of errors. However, we have found our independent inspection to be a necessary extension of statistical methods – not only double checking results but doing something about the differences.

Meetings and Discussions

The monthly Quality Control Meeting includes a) all department and section managers, b) departmentt and section Quality Control Inspectors, c) financial and advertising executives with operating responsibilities and d) the Service Auditing (Quality Control) staff. The regular Quality Control meetings and the importance attached to them underscores top management support and interest in the entire Program. We usually have an outside consultant at these meetings. His job is to discuss the control charts and answer technical questions that arise.

At the meeting, the Service Auditing Staff outlines the comparative error ratios found in the various departments. It is usually not necessary to say a great deal as the figures speak for themselves. Discussion usually concentrates on the very good results, sub-standard performance, and any operations showing abnormally small amount of variation.

Following the monthly meetings, the technical consultant and the Service Auditing Manager make a tour of the operating departments to visit with the individual managers on current activities and possible problems.

Conclusion

No Quality Control system is better than its user will make it. Whether controlling machine output or paperwork, the program depends upon accurate results and positive action taken as an immediate follow-up.

Our experience has proven to us that a healthy Quality Control program depends equally upon standardized control techniques and an active fight against errors by all levels of management.

Chapter 3

Quality Improvement in Prudential

Bennett B. Murdock

Prudential Insurance Company

Objectives

The primary aim was to do a better job either at the same or at a lower cost. Perhaps some additional cost would have been permitted if there were intangible savings. Errors in the Company records can prove costly. They can certainly cause complaints and petty annoyances affecting the good will.

We are convinced that good work creates job satisfaction and improves morale. A good craftsman takes pride in his work, and so does an excellent clerk.

The Author:

As Senior Methods Analyst, Dr. Murdock helped develop and install the quality improvement program in Prudential. He received his Ph.D. in Mathematical Statistics at Yale University. This article is one of several papers Dr. Murdock has presented on the Prudential operations.

Operation

The following steps indicate the normal operation of a Quality Control Program in a Section after the original planning has been completed.

1. The reviewers who analyze the work are chosen directly from the Section performing the work. They work under the instructions given by the Quality Control Staffman. Since the reviewers get a considerable amount of training, we rotate them every 6 to 12 weeks in order that all members may benefit from the program. This by itself gradually improves the work of the Section. We try to maintain a ratio of not more than one reviewer to every 15 clerks.

2. A unit of work is called a case. Cases selected by the sampling procedure are analyzed by the reviewers who prepare a "brief" for each case. This "brief" may be in the form of an I. B. M. card or it may only be a tally sheet.

3. Whenever an error or irregularity is discovered, the case is referred to the Section Head to discuss with and advise the clerk who was responsible. This is done in a way to help, not to criticize. We feel that the program is most effective when welcomed by the clerks on the job.

4. The reviewer's "briefs" are tabulated and analyzed weekly by the Quality Control Staff which then prepares a short report giving a comparison with previous periods. These reports are circulated to all those who are interested. Accompanying the weekly report is a memorandum containing such suggestions, analyses and comments as may seem pertinent.

5. A monthly report in the form of a graph is submitted to General Management. This combines, where possible, the records of several Sections.

The Sections covered by our Quality Control Program are surprisingly diversified as to types of work handled and ability of personnel employed. In every instance, the quality of the work has improved. In most cases, the percentage of errors has decreased 50 per cent to 90 per cent.

One particular result is interesting although not one of the original objectives. Procedures were established where none previously existed and other procedures were standardized. Work started by one clerk can now be turned over to another to finish, without causing concern.

Many suggestions have been made by the clerks reviewing the work. Seeing how others handle certain cases gives them ideas and makes them more efficient when they go back to their regular job.

Elimination of certain checks and inspections has been brought about but the quality has continued to improve. In fact, there has been created a certain consciousness of quality that didn't exist before. In one place there is strong competition between Sections and each Section maintains a large display chart of its quality. These charts are kept up-to-date daily.

One group of nearly 50 clerks performs a service which is rendered through correspondence. For years prior to the start of the Quality Control Program the percentage of completed cases to total correspondence volume remained about 29 per cent. It has since risen to 36 per cent because of the completeness of our instructions and the better understanding of what was wanted. It was estimated that this alone resulted in the savings of the time of more than ten clerks in the Division.

The operating expenses and the length of time to process work have both decreased with improving quality. It seems to be a case of "having the cake and eating it too." In addition, supervision and management have been given a tool to help in the operation of a Section or a group of Sections. Without detailed knowledge both supervision and management are handicapped.

It may be interesting to show how we determine the costs and savings of our Quality Control Programs. An actual example may be the best illustration of our method. A central record of our policies is kept in the Register Division. Changes in status are posted on the Register cards and pertinent information is transcribed from these cards prior to the making of changes.

Errors in either posting or transcribing are usually discovered sooner or later and must be corrected. This frequently requires the correction of other Company records and the cost of correcting an error can be determined. The number of errors prevented by our Quality Program can be estimated by multiplying the current volume by the difference in the error ratios (at the beginning of the program and at the time we make the comparison.) The product of the number of errors prevented and the cost of correcting an error gives the monetary gross savings. From this is subtracted the cost of the installation and maintenance of the Quality Program.

In spite of the heavy initial installation costs, we have usually come out of the red at the end of two or three months, although it took one program six months before it showed a net gain. At the end of 12 months, we have been showing a return of from $2 to $3 for every $1 spent on a particular program. We are justifiably proud of this record.

There comes a point of diminishing returns for every program. This point is indicated by the Quality graph when the line of quality starts to fluctuate around a given level. Future gains will not be commensurate with the efforts put into the program. It is at this point that we suggest a cut back in the program, or a complete discontinuance for a period of time. Strangely enough, this is when we have one of our hardest selling jobs. Management doesn't want to give up or curtail a program that has been of such value.

Conclusion

Some extremely important steps should be taken before a Quality Control Program is put into effect. It should be sold to the clerical staff, to the Section Head and to Management. Those people should thoroughly understand the basic aims of the program and participate in it to the fullest possible extent. Only with complete cooperation throughout can the program fully realize its potential.

There must be no feeling on the part of the Section Head that the program is aimed at him or is undermining his authority. The program is to be looked on solely as another tool of management. It is, therefore, imperative that members of the Quality Control Staff be diplomatic as well as capable. In all Divisions which have a Quality Control Program, there are intangible benefits which cannot be given a definite dollar value. The improvement of morale, the reduction of delays, the decrease in exposure to monetary loss and the improvement in relations with our policyholders and regional offices are all benefits which will increase with the elimination of errors. They cannot be included in a monetary comparison of costs and savings, but they should still be considered in any general evaluation of the effect of Quality Improvement. The purpose of these notes is to encourage thinking and experimenting on the application of Quality Control to clerical operations. I have purposely avoided the use of statistical formulas and any analysis of the significance of results. We do not use a Control Chart in any Section where we operate.

The Quality Control Program is being steadily expanded at The Prudential. It has proved its value to us.

Chapter 4

Building Quality in Record Making and Record Keeping

Arthur Barcan

National Records Management Council

The following procedural highlights are the products of Council research and completed installations in several score companies in private industry and in state and local governments. Here are some directional signals for a successful quality control installation.

1. **Compile basic data about the operation,** such as the work flow of "the paper," the number of employees on the job, average rate and range of production, present inspection procedures and present methods of training.

   It is only after the operation has been effectively analyzed that one can hope to pinpoint potential sources of substandard performance and evaluate relative rates of quality. For example:

   A. **Production Rates.** Unlike most industrial operations, individual clerical production is relatively small, varying from 60 units a day for typing letters to 1,600 a day for key punching to 8,000 a day for sorting. Average individual clerical production runs about 800 to 1,000 units per day with the total production depending on the number of personnel assigned to that unit. However, the significant point in Quality Control is not the volume of production, but rather the number of errors in relationship to the volume. It is, therefore, not essential for a unit or organization to have industrial assembly line figures before installing Quality Control.

   B. **Operating Procedures.** A relatively high defective rate in transcribing numbers from one side of a form to the other was sharply reduced by redesigning the form. The new form placed all transcribed data on one side, thus eliminating the need to remember figures while posting and avoid the frequent pitfall of transposed digits.

   C. **Training Methods.** Quality correspondence in the average typing pool depends upon supervisor review of the letters. A defective letter may or may not be returned to the original typist and rarely are the mistakes themselves identified by number or type. The result is that while the supervisor may catch a good proportion of the errors, there is nothing in the arrangement to prevent the errors and, therefore, rework from occurring again. Quality consciousness, with its spotlight on the quantity and source of errors, inevitably improves operations, thereby reducing unacceptable work units.

2. **Determine the existing quality level of the operation** by information on the number and types of sub-standard performance.

   A. **Identifying Quality.** The quality of a clerical operation has been highlighted with such sensitive changing indices as the ratio of records processed or filed to each employee in the organization, the number of purchase orders prepared for each thousand dollars of purchases or the dollar and cents cost for maintaining a cubic foot of records.

   Error is but one of several quality factors that can be measured and evaluated. For example, errors in filing can be identified, counted and plotted on a control chart. The quality of paperwork and record keeping, however, is determined by three additional measurable factors: technical paperwork quality; physical volume of records; availability of data in the records. All three factors can be measured and evaluated in, let us say, case records of welfare agencies against such newly developed standards as:

   1. **Technical quality control** – the number or percentage of errors in establishing eligibility, verifying claims or granting budget allowances. These are technical program items which go beyond the routine errors of typing, arithmetic and transcription. They mark the effectiveness of current instructions, training and even employment practices. Properly installed, the measure of technical errors provides a scientific internal audit of program operations.

   2. **Physical volume of records** – how many and how long are records being retained. For example, case folders are poor quality when they become bulky unorganized collections of papers. Papers being held for the full life of the folder are mixed in with "temporary" documents; supporting papers are retained even after being posted to other records inside or outside the folder; data is repeated on forms and in narrative. In such cases, poor quality coincides with high record keeping costs.

      Quality controls use such ready indexes as the total number of papers maintained in a folder, the number of papers being added each year to the folder, and the number of cubic feet of records per client.

   3. **Availability of record data** – the accuracy and accessibility of current information on a case. There are three kinds of data that are constantly changing: personal information (address, members of the family, living costs, etc.), status of initial verification of a welfare client's eligibility, and status of the follow-up on a client's eligibility. The case record of high quality is organized to provide information on all three quickly and accurately.

      Quality controls use such indexes, already applied to typing, as the length of time it takes to provide data from a sample number of cases and the number of errors found in the cases furnished.

   Data on the current operation may be obtained from representative samples of finished work, a complete recheck of a given segment of finished work or available statistics on cost, volume or errors of operation.

   B. **Measuring quality on cost and volume of the operation.** Quality of paperwork is usually measured in terms of the number of defects themselves. Technically, this is identified as inspection of attributes. In actual practice, this means that, in

inspecting paperwork an item is either right or wrong with no numbered degree of tolerance. A person's name and address is either typed correctly or it is not; a payroll check either lists the name and the sum correctly or it does not. This is different from the familiar industrial quality check where a difference of .0004 inch in the diameter of a metal screw is not only recognized but so described in the engineering specifications. Quality inspection of clerical attributes is limited to visual inspection, and tolerance in errors is most often exposed in terms of the number or percentage of defects. However, in management control reports, quality index can be expressed in terms of dollar sales, tons moved or inventory units. In such cases, the quality measure will show a numbered tolerance: that is, ± $10,000 in share holdings or ± 500 tons of freight shipped.

Data on the kinds of errors leads to a useful review of what errors are significant. For example, in one installation, where eligibility for pension or insurance payment was solely established in years, there was no need to calculate days or even months because an error in the latter would not affect the final decision. In another area, preparation of fiscal control reports, quality control considered errors in cents as unimportant and, therefore, a check on cents unnecessary, since management was only concerned with trends and round figures.

It should be repeated, however, regardless of any decisions on the significance of errors, that experience has firmly established that 100 per cent inspection does not result in 100 per cent quality. On the contrary, 100 per cent inspection frequently fails because of boredom, distractions and inability to concentrate on areas requiring most review. One project found 23 per cent errors in preparing retirement records in spite of 100 per cent inspection.

3. **Determine the quality goal of the work by joint action of whole management team** (operating office, methods examiner, top management.) Decision on the quality goal is determined by the degree of accuracy actually required on the job, the cost of 100 per cent inspection and the risk or cost of not verifying work of an unacceptable quality. "Economic tolerance level" was the phrase coined by Dr. Shewhart, pioneer in quality control, to describe the most efficient limits for defectives – thereby establishing not only what the office wants but also what the office can get or at least what it can get economically. Specific factors usually considered in determining the quality goals are:

   A. The work experience of the group.

   B. The cost of correcting an error.

   C. The possibility of catching and correcting an error in a subsequent paperwork operation.

   D. The "seriousness" of an error affecting the public.

   E. The amount of money worth spending to hold a certain quality level.

   F. The seasoned judgment of experienced management.

For example, decide that an average error of 2 per cent is acceptable; or that 3 per cent error is acceptable in purchase orders totaling $25 or less and 1 per cent in orders totaling $26 or more. In one office, an operation, aiming at 100 per cent accuracy in payment of bills, was costing $1,500 each year to catch errors totalling a net difference of about 89 cents each year.

Here are some other clerical quality goals:

a. **Record making,** such as correspondence, initially may aim at reducing the number of typing and technical errors. However, correspondence is not "high quality" until it tells its story quickly and effectively, requires few follow-up explanations and gets action in a large proportion of cases. Though the "office woods" are full of stock records, inventory records only attain high quality when the data is consistently accurate, readily available and efficiently maintained. Quality controls can be applied to insure the percentage of accuracy, the time it takes to post to one card or to furnish the current status of a stock item. All three standards are measurable and available as regular quality checks.

b. **Management reports** are quality controlled when they aim to evaluate performance of such varied items as costs, sales, inventory or disease rates. A health department report of sixty cases of measles within one month meets quality standards when the report also indicates whether the sixty cases are within control limits, whether immediate action is required or whether it warrants closer study to prevent getting out of hand. The same guides have been developed in controlled reports for a rise of 1,000 pounds of yarn in knitting mill stock, a drop in the budgeted cost of paperwork of 20 cents per company employee or a jump of 10,000 units in printing sales.

c. **Record keeping quality** includes newly developed measurable standards for records turnover, records costs and space utilization, as discussed in the Council brochure on Controlled Record Keeping.

4. **Choose the control techniques and procedures** to get a true picture of the work and to meet the quality goals.

Control Techniques

Use of control charts and sampling techniques are discussed in Chapter V. What bears repetition is the need for a simple control plan.

Quality control of paperwork depends, even more than do industrial operations, upon a control plan which can be learned quickly and maintained readily. A winning feature of the program has been its ability to maintain effective controls on a part-time basis.

A. Inspection of paperwork is often a hidden item performed either by "exchange reading" of work among operating personnel or as a part-time function of the supervisor.

B. There is no mechanism or gauge of any kind other than human inspection to check on the accuracy of the work.

C. There are at least two major areas of paperwork in which the inspector must go to the product for a check. Specifically, inspecting quality of filing and posting can only be accomplished by going right to the file folder, posted card or journal to check the accuracy of the work. This provides additional incentive for a simple effective plan in which the inspector has in advance all the samples necessary to check the quality level of the whole job.

Among available control techniques, sampling plans differ on:

1. Amount of inspection (more or less samples to check out of a given total production).

2. Ease of maintenance (more or less training and experience required of inspection personnel).

Thus, it is far more important to program success to select a sampling plan that is easily administered than to select a more complicated sampling plan -- one that might feature even less inspection at the cost of involved maintenance.

Control Procedures

This includes decisions and instructions on how the required number of samples will be selected, how the items will be checked, at what points of the operation quality will be checked and what work sheets and control charts will be used to record inspection data. Again, the keynotes are easy plus effective controls.

For example, where a product is identified by a serial number (such as in invoice, license, policy or registration number), a different last number or numbers may be selected each day to fill the necessary sample size. This would constitute getting a random sample. Thus, the inspector would check all invoices ending in "9." To get half the sample size, one might select every other "9." To double the sample size, select all invoices ending in "4" and "9."

How and at what point the samples should be checked is significant in quality control procedures. There is no problem, for example, with single quality items like filing or posting. In filing, one looks for the paper in the appropriate folder, and, if necessary, checks its sequence within the folder. Similarly, in posting, the quality inspection would cover the appropriate record and the accuracy of the transcribed data.

Where there are a number of inspection items, however, a sequence check starting with the key item may save unnecessary inspection. Common examples are checking:

- # the price per article before checking the billing price (number of items times unit price).
- # The total additions or subtractions from the previous payroll to the present payroll before verifying individual pay checks.
- # the eligibility of an applicant for pension or relief before checking the actual sum awarded.

Similarly, an administrative check often saves time prior to a technical check. Correspondence or returns can be reviewed quickly to insure that all necessary enclosures are attached and that the correct forms have been used. This may lead to rejection of samples before entering into a time-consuming technical check for accuracy, such as the accuracy of stock numbers, premium rates, pension allowances, etc.

Counting Errors

There is a tendency at the start to identify and count every possible error separately. In a paperwork area dealing with 20 to 40 specific technical errors, this will only complicate the inspection record and confound control analysis. It is far better to limit the initial categories of errors and only provide for an additional breakdown as needed -- such as a significant volume of error under "miscellaneous." For example, granting excessive allowances would be a specific type of error. In welfare work, this type of error can be further subdivided into budget cost errors for food, clothing and rent. In auto insurance, this can be further broken down by errors made on allowance for specific types of damage.

(fender, side window, etc.). In either case, however, the categories of errors would be limited as much and as long as possible.

Major and Minor Defects

There is no general need to distinguish between major and minor defects per inspected unit. It is usually sufficient to count an item defective when it has one or more errors (defects) – with each error having about equal importance. For example, in checking an invoice, an error in name, address, stock number, price per part or total cost would carry equal weight in declaring the invoice defective. The concept that "one defect is one defective" is an easy one to learn and administer. On those occasions when it is necessary to identify major and minor errors (as in a sample audit of company accounts), the distinction is then carried over to the detailed plans for sampling and rating errors. These cases, however, are not typical of the major areas of paperwork and record keeping.

Program Forms

Design of the work sheets for inspectors will depend upon the number and types of defects that are to be reported and the amount of summary statistics prepared from the initial work sheet. For example, in smaller operations where the office manager or methods analyst is working directly with the unit, a pencil-lined or duplicated form will suffice to post the number and types of errors. In a larger operation it may be advisable to design a key-sort or tabulated punched card to serve both purposes of inspectors' report and summary analysis.

Presenting Q.C.

The manner of presenting quality control to employees is a matter of the initial control technique and procedure plus individual preference. In this publication Aldens discusses Statistical Quality Control and favors the Control Chart itself showing the number of defects (per hundred samples) to highlight quality control status. Prudential Insurance Company, however, presents the program as Quality Improvement and publicizes the work in some units by a daily posting of the per cent of accuracy (100 per cent minus the percentage of defects). In other installations, quality control of record making is reported in terms of the budget cost of paperwork (supplies and equipment) per employee or per cubic foot of records. Quality control of record keeping is generally presented in terms of records turnover: that is, the percentage of all records that have been disposed of or sent to low-cost storage.

5. **Install quality control in a pilot unit.**

   A. Select and indoctrinate a unit interested in giving the program a wholehearted fair trial.

   B. Select and indoctrinate effective personnel to appraise the work.

   C. Educate the various levels of management on what the program will and will not do during the pilot installation.

      Success of quality control installations has been due not only to technical soundness but also to support of the program at all levels. Support is a natural consequence of effective orientation and understanding at all levels. Effective selling makes sure that every one knows, in addition to program objectives, how the program will affect him – his work, his pay, and his status. Almost every installation reports a general awareness of quality which has all personnel looking more closely at what they are doing to uncover existing or potential sources of error. This "quality consciousness" inevitably results in improved training and operating procedures and in bolstering employee confidence.

6. **Follow-up on data highlighted by the control plan.**

Controls are only valuable in pointing up to management where and when corrective action should be taken. Program effectiveness depends on the extent to which the various levels of management act upon this information. Management shows it is actively interested when it calls supervisors together to discuss significant items in the control reports, praises a unit for good quality or reduces the amount of inspection on the basis of a consistently improved performance.

On an operating level, and as a correspondence unit, the supervisor achieves continued high quality by identifying successful letter writing, highlighting the types of letters which recur often enough to warrant a standard "quality" response, pinpointing the "letter writers" who merit praise or require additional training. Follow-up on record keeping will include sampling surveys on reference analysis – the reference or use per cubic foot of records to indicate whether the records schedule should be revised, and whether records in a storage area require more or less handling and, therefore, a more or less accessible location.

Follow-up on record making will include the number of cubic feet of records in the office as compared to the number of employees. Present studies indicate, for example, that medium-size manufacturing companies need make and keep only one cubic foot of records per employee, the average commercial or government organization about 3 to 1. This can be further controlled, as indicated before, by the budget cost of paperwork per employee or per cubic foot of office records.

Follow-up on job training will concentrate on "high error" areas and on conventional error traps in training like "just watching the best worker." Tangible quality standards can be used to:

A. Tie in with work measurement for a realistic wedding of quality plus quantity in clerical operations.

B. Limit the training period to what is needed and avoid expensive reliance on a common schedule for all (set a training goal, let us say, of typing 100 manila addressed envelopes with no error in one hour; keypunching four hundred 45-column cards with one error in two hours, posting in one hour 500 time cards to a payroll with one error).

It is in the follow-up that good indoctrination will pay extra dividends. For example, the initial phases of the program are usually distinguished by a sharp improvement in quality and relatively large savings. As the program continues, the benefits are no longer measured in the same spectacular improvements but rather in the steady maintenance of a better-quality operation. Therefore, the cost of a continuing program is offset not by the current savings alone but by comparison with the operation before the controls were instituted. A well indoctrinated management will have learned the lesson that dropping the program will inevitably throw the operation back to its previous unsatisfactory status.

7. **Extend the program.**

Once the pilot installation is operating, select equally profitable applications to paperwork and record keeping. A satisfactory model right within one's own organization changes the question from "Can we do it" to "When can we do it"?

The continuing quality control program depends upon combining records management, statistical control and general management know-how.

Records management performs the technical diagnosis of what is weak or wrong, and provides standards for specific records operations – the basis for quality records and reduced rework.

Statistical control provides the scientific methods for measuring and evaluating a complete operation with only partial inspection – the key to lower costs and effective controls.

Management know-how determines the likely pilot installations, the personnel with greatest program potential, and the best ways in which to "sell" quality control to all levels of the organization.

Chapter 5

Quality Control Techniques for Paperwork and Record Keeping

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Control techniques are designed to provide a true picture of the work and to meet quality goals. This would include the decisions on the control limits, allowable number of errors, size and scope of the sample. Despite the complexity of mathematical statistics and the growing number of sampling plans available to technicians, applying quality control to paperwork and record keeping need only require real understanding and practical experience in the four following techniques.

1. The control chart.
2. A single sampling plan.
3. A continuous sampling plan.
4. Survey sampling.

1. **The Control Chart (chart I)** is the graphical record indicating the actual quality performance as noted by the number of defectives or percentage of defectives found in each sample group inspected. To this record data is subsequently added upper and lower control limits based on past experience and standards concerning the clerical product. Control limits have been compared to highway markers indicating the safe areas for travel. Where the control limits indicate that the number of defects are within limits, then the process may be safely considered under control. For example, an operation is under control when:

Out of	
25 points	0 fall outside the limit
35 points	1 falls outside the limit
100 points	2 or less fall outside the limit

The control chart indicates immediately whether the process is in control and when corrective action should be taken. As a scientific quality "meter," it thus not only provides danger signals to management but also hoards supervisory time by eliminating premature concern and needless action.

2. **A Single Sampling Plan** based on the Dodge-Romig tables (chart II) is designed to insure at minimum expense a specified Average Outgoing Quality Limit (AOQL). The AOQL for a given clerical operation is the maximum percentage of errors (worst per cent defective) in the resultant product that would not be exceeded in the long run no matter what may be the percentage defective submitted by review. The tables have been organized to give a prearranged answer on the size of the sample and the number of allowable defectives, given three figures:

   A. AOQL – the desired quality production.

   B. Process Averages (p.a.) – current average per cent of defectives in the clerical

product submitted for inspection.

C. Lot size – the total number submitted for inspection.

As shown in chart II, figure I, if the sample in any one lot contains more defectives than allowed, the lot is inspected 100 per cent and all defectives corrected. This serves as a large screen by which the AOQL is achieved in the product as a whole.

3. **A Continuous Sampling Plan.** In advanced quality control installations, one can use the random order continuous sampling plan developed by Harold F. Dodge of Bell Telephone Laboratories. Chart III, prepared by the National Records Management Council, is based on the curve chart developed by Mr. Dodge. Effective use of the plan depends upon choosing a realistic average outgoing quality limit (AOQL) and percentage of work to be inspected. It has proven particularly valuable in paperwork installations covering relatively small work load.

4. **Survey Sampling.** Survey sampling has been used to improve the quality of an organization's record making and record keeping. A sample audit of an organization will indicate whether too many documents are being made and filed, whether too many records are being accumulated in expensive space and equipment or whether correspondence is effective as well as corrective. Another example is the correspondence study conducted by the Navy which reduced the filing of 2,000,000 documents annually by one third; in one office alone filing was reduced by over 80 per cent. The Bureau of Internal Revenue has used sampling techniques to reduce the number of tax returns for statistical and archival purposes to manageable proportions. By deciding what information was required and what percentage of error was allowable, the Bureau was able to select an efficient sample size and avoid an otherwise large additional expenditure in personnel, space and equipment.

All four techniques are relatively simple to install and easy to maintain. Not only are the first three techniques admirably suited for initial installation of paperwork controls but they are also designed to provide either reduced or tightened sampling plans depending on whether the quality improves or declines sufficiently. "Home-made" quality control techniques will provide data on the process average and will, when competently administered, result in real improvement. It has been proven time and again that the mere posting of an understandable chart showing quality either as number of defects, per cent of the defects or per cent correct will by itself provide a tangible incentive for quality improvement.

The average of the preceding recommended techniques is that they provide additional powerful advantages over the "home-made" variety.

1. **The control chart** is the only scientific method presently devised to place control limits on the record data obtained from sampling. With control limits one not only is alerted to action that should be taken but also may avoid taking unnecessary action. Only the control limits can provide reasonably objective aids to management executives on quality.

2. **The recommended sampling plans** are designed to provide the maximum protection at minimum inspection costs. They provide a scientific safeguard on the number of samples and proportionate number of defects necessary to arrive at a firm decision on quality. While they may be more "expensive" (requiring larger samples) than double or sequential plans, the advantages to be gained by a simple plan for installation and operation more than offsets additional inspection costs.

3. **The single sampling plan** allows the reduced or tightened sampling as required — retaining the feature of the new minimum sample needed to provide adequate and effective quality controls. The recommended continuous sampling plan uses more empirical methods to reduce or tighten inspection.

4. **Survey sampling** provides a continuing effective control on record making and record keeping and eliminates the need for special frenzied campaigns against paperwork. However, experience is essential in insuring that the sample selected is adequate, accurate and representative of the total population it aims to measure. The exact plan for a sampling survey will depend upon the specific paperwork operation under study; for example, whether the work units are identifiable by number, whether the units are received consecutively, whether they can be carried to and inspected at one's desk and what statistics are already available on the particular process.

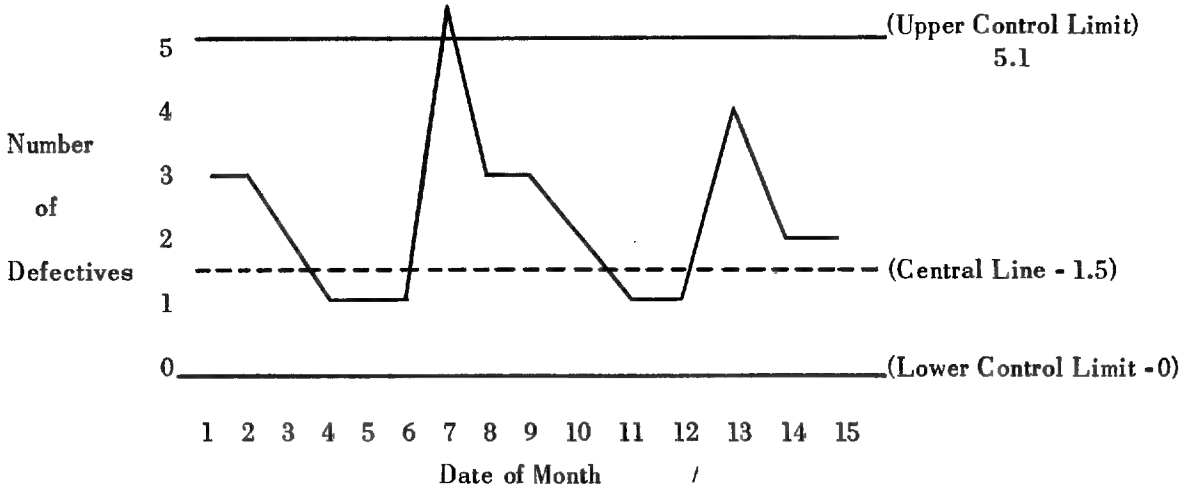
Chart 1 – Control Chart for Quality of Paperwork

Example – Daily inspection of sample lots of 100 clerical units each.
Desired quality – 98.5% accuracy (or 1.5% error)

Fig. 1 – Inspection Data for Two Week Period

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No. of Units Inspected	100 units inspected each day														
No. of Defective Units	3	3	2	1	1	1	6	3	3	2	1	1	4	2	2
Per Cent Defective	3	3	2	1	1	1	6	3	3	2	1	1	4	2	2

Fig. 2 – Control Chart Based on Inspection Data



1. Maintaining a control chart is an easy and daily duty performed right after inspection.
2. If it is not possible to use a group of 100 units, which automatically converts the number of defectives into per cent defective, the design of the control chart can include an automatic conversion (with both sets of numbers) on the left side of the chart to eliminate unnecessary computation or error.
3. Points going over 5 indicate the process is out of control. If no points are outside, the process may be considered to be under control. There is an algebraic formula for deriving the control limits (in this case ± 5). However, simplified charts are available to assist in the derivation without resorting to the formula itself.

Chart II – Dodge-Romig Single Sampling Inspection Plan

Fig. 1 – Portion of Dodge-Romig Table SA 3.0

Average Outgoing Quality Limit (AOQL) – 3.0%

Process Average %	0 – .06		.07 – .60		.61 – 1.20		1.21 – 1.80	
Lot Size	n	c	n	c	n	c	n	c
501 – 600	12	0	27	1	27	1	42	2
601 – 800	12	0	27	1	27	1	43	2
801 – 1000	12	0	27	1	44	2	44	2
1001 – 2000	12	0	28	1	45	2	65	3

(Where data is not available for firm choice of Process Average, use right column or close to it).

Fig. 2 – Procedure for Use of Dodge-Romig Table

Example – Inspection of 1000 clerical units for AOQL of 3% P.A. of 1%

Number of Work Units in Lot Size	Number of Work Units in Sample	Clerical Work is Acceptable	Clerical Work is Unacceptable
		Where number of incorrect work found in sample is	
		Equal to or less than	Equal to or more than
1000	44	2	3

(Based on Amer. Tel. & Tel. presentation of quality control)

Chart III – Sampling Plan for Continuous Production

Percentage of Work To Be Inspected	Average Outgoing Quality Limit (in Per Cent Defective)											
	10%	8	6	5	4	3	2	1	.5	.3	.2	.1
10	10	15	15	20	25	35	55	110	220	370	550	1100
8	10	15	20	25	30	40	60	120	250	415	610	1200
6	15	15	20	25	35	45	70	140	280	470	700	1400
5	15	20	25	30	35	50	75	150	300	510	760	1500
4	15	20	25	30	40	55	80	165	335	555	830	1700
3	15	20	30	35	45	60	90	185	345	620	920	1880
2	20	25	35	40	50	70	110	215	450	710	1080	2130

Instructions for use of chart:

Example – The management team decides on 5% A.O.Q.L. and 3% work units to be inspected with the following procedure:

1. Complete Inspection

   In the beginning, inspect 100% of the units as they are produced until 35 work units are found clear of defects. (The number, 35, is found in the 5% AOQL column and on the horizontal line corresponding to 3% inspection and indicates the number of work units in succession to be found clear of defects. Note that the lower the A.O.Q.L. and percentage inspection one selects, the higher is the number of units one must find correct.)

2. Sample Inspection

   When 35 units are found clear of defects, discontinue 100% inspection and verify only 5% of the succeeding work units. Continue this 5% inspection until an error is found.

3. Complete Inspection

   When an error is found, revert immediately to 100% inspection as in paragraph 1. For continuing clerical operation, conduct complete inspection (100%) or sample inspection (5%) as instructed in paragraphs 1 and 2 above.

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